



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Roger E. Welser, Paul M. Deluca and Noren Pan
Application No.: 10/824,697 Group: 2813
Filed: April 14, 2004 Examiner: Not Assigned
Confirmation No.: 6799
For: BIPOLAR TRANSISTOR WITH LATTICE MATCHED BASE LAYER

CERTIFICATE OF MAILING OR TRANSMISSION	
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8-11-04	<i>Jane Morgan</i>
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Typed or printed name of person signing certificate	

INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Information Disclosure Statement is submitted:

- ☐ under 37 CFR 1.129(a), or
(First/Second submission after Final Rejection)
- ☒ under 37 CFR 1.97(b), or
(Within any one of the following time periods: three months of filing national application (other than a CPA) or date of entry of the national stage in an international application; or before the mailing date of a first office action on the merits in a non-provisional application, including a CPA, or a Request for Continued Examination).
- ☐ under 37 CFR 1.97(c) together with either:
- ☐ a Statement under 37 CFR 1.97(e), as checked below, or
- ☐ a \$180.00 fee under 37 CFR 1.17(p), or
(After the 37 CFR 1.97(b) time period, but before final action or notice of allowance, whichever occurs first)
- ☐ under 37 CFR 1.97(d) together with:
- ☐ a Statement under 37 CFR 1.97(e), as checked below, and
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(Filed after final action or notice of allowance, whichever occurs first, but on or before payment of the issue fee)
- ☐ under 37 CFR 1.97(i):
Applicant requests that the IDS and cited reference(s) be placed in the application filewrapper.
(Filed after payment of issue fee)

Statement Under 37 CFR 1.97(e)

- ☐ Each item of information contained in this Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement; or
- ☐ No item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned, after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of this Information Disclosure Statement.

Statement Under 37 CFR 1.704(d) (Patent Term Adjustment)

Applies to original applications (other than design) filed on or after May 29, 2000

- ☐ Each item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.
- ☒ Enclosed herewith is form PTO-1449:
 - ☐ Copies of the cited references are enclosed.
 - ☐ Since this application was filed after June 30, 2003, copies of issued U.S. patents and published U.S. applications are not required and are not being provided.
 - ☒ Copies of the cited references are enclosed except those entered in prior application, U.S. Application No. 09/995,079, to which priority under 35 U.S.C. 120 is claimed. The earlier application contains copies of the cited references.
 - ☐ The listed references were cited in the enclosed International Search Report in a counterpart foreign application.
 - ☒ The "concise explanation" requirement (non-English references) for references AN and AO under 37 CFR 1.98(a)(3) is satisfied by:
 - ☐ the explanation provided on the attached sheet.
 - ☐ the explanation provided in the Specification.
 - ☐ submission of the enclosed International Search Report.
 - ☐ submission of the enclosed English-language version of a foreign Search Report and/or foreign Office Action.
 - ☒ the enclosed English language abstract of reference AN.
 - ☒ the previously entered English language abstract of reference AO in the earlier application.

☐ Applicant requests that the following non-published pending applications be considered:

Examiner's
Initials

____ U.S. Patent Application No. [], by [inventor(s)], filed [], Docket No.: []
____ U.S. Patent Application No. [], by [inventor(s)], filed [], Docket No.: []
____ U.S. Patent Application No. [], by [inventor(s)], filed [], Docket No.: []

Examiner

Date

- ☐ A copy of each above-cited application, including the current claims, is enclosed.
- ☐ A copy of each above-cited application, including the current claims, is enclosed, except those entered in prior application, U.S. Application No. [], to which priority under 35 U.S.C. 120 is claimed.

The Examiner is requested to return a copy of the above list of pending applications indicating which references were considered with the next office communication.

It is requested that the information disclosed herein be made of record in this application.

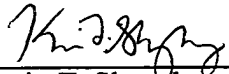
Method of payment:

- ☐ A check for the fee noted above is enclosed, or the fee has been included in the check with the accompanying Reply. A copy of this Statement is enclosed.
- ☐ Please charge Deposit Account 08-0380 in the amount of \$[]. A copy of this Statement is enclosed.
- ☒ Please charge any deficiency in fees and credit any overpayment to Deposit Account 08-0380.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By



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Concord, MA 01742-9133

Dated: 8/11/04

PTO-1449 REPRODUCED		ATTORNEY DOCKET NO. 0717.2013-013		APPLICATION NO. 10/824,697	
INFORMATION DISCLOSURE CITATION IN AN APPLICATION August 9, 2004 (Use several sheets if necessary)		FIRST NAMED INVENTOR Roger E. Welser		FILING DATE April 14, 2004	
		EXAMINER Not Assigned		CONFIRMATION NO. 6799	
				GROUP 2813	

U.S. PATENT DOCUMENTS

EXAM- INER INI- TIAL	REF. NO.	DOCUMENT NUMBER Number-Kind Code (if known)	ISSUE DATE / PUBLICATION DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT
	AA	US 2001/0040244 A1	11-15-2001	Fitzgerald, <i>et al.</i>
	AB	6,031,256	02-29-2000	Liu, <i>et al.</i>
	AC	5,606,185	02-25-1997	Nguyen, <i>et al.</i>
	AD	US 6,285,044 B1	09-04-2001	Bhat
	AE	US 6,150,677	11-21-2000	Tanaka <i>et al.</i>
	AF	US2002/0102847 A1	08-01-2002	Sharps <i>et al.</i>
	AG	US 6,150,667	11-21-2000	Ishizaka <i>et al.</i>
	AH	US 2002/0027232 A1	03-07-2002	Shigematsu <i>et al.</i>
	AI	4,518,979	05-21-1985	Dumke <i>et al.</i>
	AJ	5,371,389	12-06-1994	Matsuno <i>et al.</i>
	AK	5,429,957	07-04-1995	Matsuno <i>et al.</i>
	AA2	5,571,732	11-05-1996	Liu
	AB2	5,814,843	09-29-1998	Ohkubo
	AC2	5,858,818	01-12-1999	Ro <i>et al.</i>
	AD2	5,903,018	05-11-1999	Shimawaki
	AE2			
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EXAMINER	DATE CONSIDERED
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PTO-J449 REPRODUCED INFORMATION DISCLOSURE CITATION IN AN APPLICATION August 9, 2004 (Use several sheets if necessary)	ATTORNEY DOCKET NO. 0717.2013-013		APPLICATION NO. 10/824,697	
	FIRST NAMED INVENTOR Roger E. Welser		FILING DATE April 14, 2004	
	EXAMINER Not Assigned		CONFIRMATION NO. 6799	GROUP 2813

FOREIGN PATENT DOCUMENTS						
		DOCUMENT NUMBER Country Code-Number-Kind Code (if known)	DATE MM-DD-YYYY	NAME OF PATENTEE OR APPLICANT OF CITED DOCUMENT	TRANSLATION YES NO	
	AL	WO 01/03194 A1	01-11-2001	Picogiga	X	
	AM	WO 02/43155 A2	05-30-2002	Kopin Corporation		
	AN	FR 2 795 871 A1	01-05-2001	Picogiga		X
	AO	JP 11312685	11-09-1999	Fujitsu Ltd.		X
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PTQ-1449 REPRODUCED INFORMATION DISCLOSURE CITATION IN AN APPLICATION August 9, 2004 (Use several sheets if necessary)	ATTORNEY DOCKET NO. 0717.2013-013		APPLICATION NO. 10/824,697	
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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)	
AR	Chang, <i>et al.</i> , "InGaAsN/AlGaAs P-n-p heterojunction bipolar transistor," <i>Applied Physics Letters</i> , 79(19):2788-2790 (2000).
AS	Welser, <i>et al.</i> , "Low V_{be} GaInAsN Base Heterojunction Bipolar Transistors," <i>IEICE Trans. Electron.</i> , E84-C(10): 1389-1393 (2001).
AT	Li, <i>et al.</i> , "DC characteristics of MOVPE-grown Npn InGaP/InGaAsN DHBTs," <i>Electronics Letters</i> , 36(1): 81-83 (2000).
AU	Kohama, <i>et al.</i> , "Using Carbon Tetrachloride for Carbon Doping $Al_xGa_{1-x}As$ Grown by Metalorganic Chemical Vapor Deposition," <i>Jpn. J. Appl. Phys.</i> , 34(7A): 3504-3505 (1995).
AV	Sugiura, <i>et al.</i> , "Characterization of heavily carbon-doped InGaAsP layers grown by chemical beam epitaxy using tetrabromide," <i>Applied Physics Letters</i> , 73(17):2482-2484 (1998).
AW	Bhat, <i>et al.</i> , "Growth of GaAsN/GaAs, GaInAsN/GaAs and GaInAsN/GaAs quantum wells by low-pressure organometallic chemical vapor deposition," <i>Journal of Crystal Growth</i> , 195: 427-437 (1998).
AX	Chang, <i>et al.</i> , "InGaP/InGaAsN/GaAs NpN double-heterojunction bipolar transistor," <i>Applied Physics Letters</i> , 76(16):2262-2264 (2000).
AY	Welser, R.E., <i>et al.</i> , "Role of Neutral Base Recombination in High Gain AlGaAs/GaAs HBT's," <i>IEEE Transactions on Electron Devices</i> , 46(8):1599-1607(1999).
AZ	Ahmari, D.A., <i>et al.</i> , "High-speed InGaP/GaAs HBT's with a Strained $In_xGa_{1-x}As$ Base," <i>IEEE Electron Device Letters</i> , 17(5):226-228(1996).
AR2	Welser, R.E., <i>et al.</i> , "Turn-on Voltage Investigation of GaAs-Based Bipolar Transistors with $Ga_{1-x}In_xAs_{1-y}N_y$ Base Layers," <i>IEEE Electron Device Letters</i> , 21(12):1-4(2000).
AS2	Low, T., <i>et al.</i> , "InGaP HBT technology for RF and microwave instrumentation," <i>Solid-State Electronics</i> , 43:1437-1444(1999).
AT2	Liu, W., <i>et al.</i> , "Current Transport Mechanism in GaInP/GaAs Heterojunction Bipolar Transistors," <i>IEEE Transactions on Electron Devices</i> , 40(8):1378-1383(1993).
AU2	Lu, Z.H., <i>et al.</i> , "Determination of band gap narrowing and hole density for heavily C-doped GaAs by photoluminescence," <i>Appl. Phys. Lett.</i> , 64(1): 88-90(1994).

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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)		
AV2	Welser, R.E., <i>et al.</i> , "High Performance Al _{0.35} Ga _{0.65} As/GaAs HBT's," <i>IEEE Electron Device Letters</i> , 21(5):196-199(2000).	
AW2	Welser, R.E., <i>et al.</i> , "Base Current Investigation of the Long-Term Reliability of GaAs-Based HBTs," <i>GaAs Mantech</i> , (2000).	
AX2	Patton, G.L., <i>et al.</i> "Graded-SiGe-Base, Poly-Emitter Heterojunction Bipolar Transistors," <i>IEEE Electron Device Letters</i> , 10(12):534-536(1989).	
AY2	Ida, M., <i>et al.</i> , "InP/InGaAs DHBTs with 341-Ghz f _T at high current density of over 800 kA/cm ² ," <i>IEEE</i> , (2001).	
AZ2	Kroemer, H., "Heterostructure bipolar transistors: What should we build?" <i>J. Vac. Sci. Technol.</i> , B1(2):126-130(1983).	
AR3	Fujihara, A., <i>et al.</i> , "High-speed InP/InGaAs DHBTs with Ballistic Collector Launcher Structure," <i>IEEE</i> , (2001).	
AS3	Nakahara, K., <i>et al.</i> , "Continuous-wave operation of long-wavelength GaInNAs/GaAs quantum well laser," <i>Electronic Letters</i> , 32(17): 1585-1586(1996).	
AT3	Mochizuki, K., <i>et al.</i> , "GaInP/GaAs Collector-Up Tunneling-Collector Heterojunction Bipolar Transistors (C-Up TC-HBTs): Optimization of Fabrication Process and Epitaxial Layer Structure for High-Efficiency High-Power Amplifiers," <i>Transactions on Electron Devices</i> , 47(12):2277-2283(2000).	
AU3	Pan, N., <i>et al.</i> , "Pseudomorphic In-Graded Carbon Doped GaAs Base Heterojunction Bipolar Transistors by Metal Organic Chemical Vapor Deposition," <i>Journal of Electronic Materials</i> , 25(7):13 (1996).	
AV3	Ohkubo, M., <i>et al.</i> , "Compositionally Graded C-doped In _{1-x} Ga _x As Base in InP/InGaAs D-HBTs Grown by MOCVD with Low Base Sheet Resistance and High Current Gain", <i>IEEE</i> , pp. 641-644, 1997.	
AW3	Stockman, S. A., <i>et al.</i> , "Carbon Doping of In _x Ga _{1-x} As By MOCVD Using CCl ₄ ", pp. 40-43, no date given.	
AX3	Keiper, D., <i>et al.</i> , "Metalorganic Vapour Phase Epitaxy Growth of InP-based Heterojunction Bipolar Transistors with Carbon Doped InGaAs Base Using Tertiarybutylarsine and Tertiarybutylphosphine in N ₂ Ambient", XP-001030248, <i>Jpn. J. Appl. Phys.</i> , Vol. 39:6162-6165 (2000).	

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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)		
	AY3	Stillman, G. E., <i>et al.</i> , "Carbon-doped InGaAs grown by MOCVD for InP/InGaAs heterojunction bipolar transistors", <i>Inst. Phys. Conf. Ser. No. 129</i> :687-692 (1992).

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